glucose content than is the arterial supply to the extremity. This finding is quite challenging since it suggests that under certain circumstances glucagon may be capable of functioning through enzyme systems other than liver phosphorylase in the release of glucose from glycogen. The phenomenon is presently being explored by studies in completely isolated extremities, the venous blood being collected in reservoirs. In addition, metabolic incubator studies are also in progress.

The seeming paradox of glucagon action, now raising and now lowering blood glucose, evidently depends precisely on which phase of the glucose wave is being exposed to the hormone. Whether the direction of the blood-glucose trend is upward or downward, the momentum of an uncompleted phase is increased or potentiated by glucagon.

The implications of the afore-described findings in clinical diabetes are legion. Is the clinical diabetic or the prediabetic individual one who has a perverted insulin-glucagon functional relationship? In these people, does insulin, intrinsic or extrinsic, in small "catalytic" dosage have the functional effect of touching off an overresponsive intrinsic glucagon mechanism at a high level of blood glucose? In similar manner, in *nondiabetic* individuals glucagon activity with its hyperglycemic effect is thrown into function by small doses of insulin only when this is administered at low mean fasting glucose levels. This finding was made in 100 nondiabetic individuals. If a perverted functional relationship exists in the diabetic suffering from a relative deficiency of insulin, the afore-mentioned concepts open up wide vistas for improving the underlying functional defect. Fortunately, in many individuals with the obese-adult type of diabetes, such apparent perversion of function is reversible by adequate therapy (*8*). This improvement is readily measurable by the so-called "six-minute responsiveness test to glucagon-free insulin," a measure of the body's ability to *respond* to insulin rather than to make it (*9, 10*).

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J. P. Marble, Research Geochemist

John Putnam Marble was born in Worcester, Massachusetts, 30 May 1897, and died suddenly in Washington, D.C., 6 June 1955. Since the drysaltery business was the pursuit of the family, his interest in chemistry developed at an early age. He graduated *cum laude* from Williams College in 1918 after election to Phi Beta Kappa in his junior year. He was corecipient of the John Sabin Adriance Prize in Chemistry. He entered the Chemical Warfare Service of the Army in 1918; after his discharge in early 1919, he attended Clark University as a part-time student. At the end of the school year he entered the family drysaltery business, where he continued until 1926. He then began his work at Harvard University, taking his master's degree in chemistry in 1928 and his doctorate in analytical chemistry in 1932 under G. P. Baxter.

He began, then, to find his broad interests, applying his knowledge of chemistry to the research analysis of radioactive minerals in the laboratories of the U.S. Geological Survey (1931–35) and the Smithsonian Institution (1935–55) under the auspices of the Committee for the Measurement of Geologic Time of the National Research Council. This work still occupied much of his time up to his death. During the summers through the 1930's and into the 1940's, he worked at Harvard on chemical atomic weights and devoted some time at Yale in 1939 to the preliminary preparation of thorium standards. During World War II he served as technical aide and special assistant of the National Defense Research Committee of the Office of Scientific Research and Development. His work on radioactivity and isotopes took him into close association with Alfred C. Lane, with whom he worked on the Committee on the Measurement of Geologic Time, first as a member, then as vice chairman (1936–46), and, from shortly before Lane's death, as chairman (1946–55). His work in preparing reports of the committee, with extensive critical international bibliographies, was increasingly large as the field became more and more active. The reports are a valuable addition to the literature, and the demand for them is increasing. In addition to his annual reports of the Committee on the Measurement of Geologic Time, he was the author of some 20 papers on age determinations and related subjects published in various journals, chiefly the *American Mineralogist.*

His was a work of love, and his diligence in pursuing it so actively bespeaks the character of the man and his true qualities as a scientist. There was something of a Newton and a Darwin in his perseverance and his integrity.

The work on isotopes and geologic time took Putnam more and more afield from chemistry into the realms of geochemistry and geophysics, and his boundless energy to pursue the tasks that he undertook placed many calls on him. He claimed not to like people, and yet he was always doing for people—as trustee of Sidwell Friends School, as chairman of the Committee on Meetings of the American Geophysical Union, and, for the last 2 years, as its general secretary, and in various other activities. He liked people and liked doing for them, but his Quaker background caused him to dislike the controversy and tensions that often arise from disagreements and differences of opinion. The problems involved weighed on him heavily, whether as general secretary of the American Geophysical Union, a member of the Council of the American Association for the Advancement of Science, or secretary-treasurer of the American Geological Institute. His life was truly that of a scholar who rather resented the intrusions of modern-day life caused by the rapid development of science.

He was never happier than when he was at work in his laboratory, unless it was with hammer and lens on scientific field trips, or exploring the wilds of the Adirondack Mountains, where he spent many summers.

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